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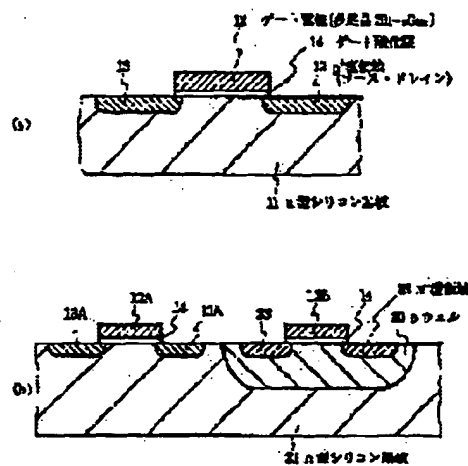
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(54) SEMICONDUCTOR DEVICE

(57)Abstract:

PURPOSE: To control work function difference with a silicon substrate at a small value, and to control threshold voltage easily by using a polycrystalline silicon-germanium alloy film as a part of the gate electrode of an insulated-gate field-effect transistor.

CONSTITUTION: A polycrystalline silicon-germanium alloy ($\text{Si}_{1-x}\text{Ge}_x$) is formed onto the surface of an n-type silicon substrate 11 while holding a gate oxide film 14, and a gate electrode 12 is formed through patterning. The ions of BF_2 or B are implanted while employing the gate electrode as a mask, and p+ regions 13 as source-drain are shaped. A p-well 20 is formed to the surface of an n-type silicon substrate 21 through the implantation of phosphorus ions and heat treatment. Gate electrodes 12A, 12B composed of a polycrystalline $\text{Si}_{1-x}\text{Ge}_x$ film containing boron are formed through the gate oxide films 14. An n+ type region 23 is shaped through the implantation of As ions. A p-channel transistor is formed by shaping the gate electrode 12A, a p+ type region 13A, etc.



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